Code No: 11407

FACULTY OF ENGINEERING

BE (ECE) III - Semester (Main & Backlog) Examination, November / December 2018

SIGNAL ANALYSIS & TRANSFORM TECHNIQUES

Time: 3 Hours **Max Marks: 70**

Note: Answer all questions from **Part-A** at one place in the same order
Answer any **five** questions from **Part -B**

PART - A (20 Marks)

1. Sketch the following signal x(t) = [U(t) – U(t -4)] (2)
2. Whether the following signals are Energy or Power? x(n) = [n U(n)] & x(n) = [r(n) -r(n-1)] (2)
3. Describe Analogy between vectors and Signal? (2)
4. What are the Dirichlet conditions? (2)
5. Explain wave symmetry? How many types of wave symmetries are there? (2)
6. Derive Autocorrelation property of Fourier Transform? (2)
7. Distinguish between Laplace and Fourier transform? (2)
8. What are the properties of ROC in z-domain? (2)
9. Find z transform of the following signal x(n) = [a^n Sin(nw) U(n)] (2)
10. Explain the concept of Stability and Causality in Z-domain (2)

PART - B (50 Marks)

11. (a) Obtain Trigonometric Fourier series for full wave rectified Cosine function as given below: x(t) = { A Cos(ω_0 t) } for $0 < t < \pi$; (5)
    (b) Show that the functions Sin ($n\omega_0 t$) and Cos($m\omega_0 t$) are Orthogonal over any interval [t_0 to ($t_0 + 2\pi/\omega_0$)] (5)
12. (a) Find Fourier transform of the following signals using properties (5)
    (i). x(t) = [e^{-at} U(t)] (ii) x(t) = {$\delta(t+2) + \delta(t+1) + \delta(t-1) + \delta(t-2)$}
    (b) The in put and out put of a Causal LTI System is described by [d^2y/dt^2 +5(dy / dt) +6 y(t) = x(t) ; find the impulse response of the system? (5)
13. (a) Find the Laplace transform of the signal x(t) ={ $t^2 e^{-3t}$ U(t) } ; plot ROC (5)
    (b) Find inverse Laplace transform of X(s) =[s/ (s+1) (s+2)]; and hence find Initial and final values? (5)
14. (a) State and prove the initial and final value theorems in Z-domain (5)
    (b) Find the impulse response and step response for an LTI system given below y(n) = [y(n-1) + 0.5y(n-2) +x(n) +x(n-1)]; using Z-transform ? (5)
15. (a) Obtain a relation between Convolution and Correlation? (5)
    (b) Find the Autocorrelation of x(t) = A Cos ($\omega_0 t + \Theta$); (5)
16. (a) Derive all the properties of Cross Correlation function? (5)
    (b) Distinguish between Energy density and Power Spectral Density? (5)
17. (a) State and prove any five properties of Z-Transform? (5)
    (b) Write short notes on classification of Signals. (5)

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